Wawona Middle School:
Multi-Purpose Room Demonstration Project

The State and Consumer Services Agency (SCSA) was recently awarded a grant from the California Public Utilities Commission (CPUC) to develop and implement the School Energy Efficiency (SEE) Program. The SEE Program is comprised of two integrated components: (1) classroom, professional development, and service learning activities designed to educate students, teachers, and school officials about energy efficiency and (2) school facility improvement efforts designed to provide facility operators and administrators with technical assistance, demonstration technology, and operation and maintenance training.

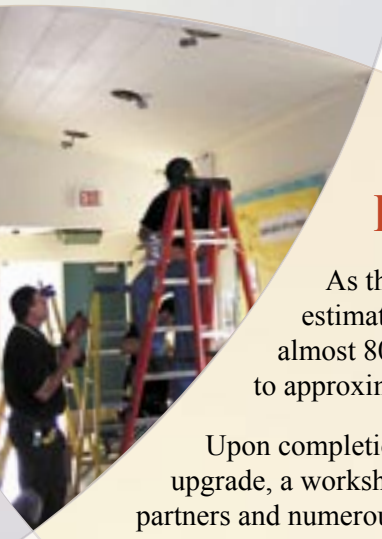
"It is wonderful to have controls for separate areas of the room to reduce the number of lights used when only a small portion of the room is occupied...Great energy savings and better lighting."

Lyn Peters,
Manager of Environmental Services
Fresno Unified School District

DEMONSTRATION PROJECT DESCRIPTION

Wawona Middle School, located in Fresno Unified School District (FUSD), serves roughly 840 seventh and eighth graders. Wawona's facilities were recently modernized, however upgrades to its multi-purpose room only included new floors and paint, leaving incandescent lighting with recessed cans to illuminate the room's 4,083 square foot space. The multi-purpose room serves as the cafeteria for the entire student body and faculty and also for school assemblies, stage productions, staff meetings, and a myriad of community activities, including City Council, Sheriff's Department, Girl Scout, and Parent Teacher Association meetings.

Through valuable partnerships with equipment manufacturers, contractors, school district facility and education staff, and the State and Consumer Services Agency and its energy consultant, the multi-purpose room was retrofitted with energy efficient lighting and a lighting control system. SEE Program partners such as Philips (lamps), PowerLux (fixtures), and WattStopper (occupancy sensors) donated materials at no cost to the district and Progressive Energy Management (fixtures) and WattStopper completed the installation. In all, 72 recessed cans and incandescent lamps were replaced with ballasted recessed cans and compact fluorescent lamps. In addition, occupancy sensors, featuring automatic shut-off and user adjustable time delay components, were installed.



ENERGY & COST SAVINGS

As the Table shows, the retrofit project is estimated to reduce energy consumption by almost 80 percent—20,000 kWh per year—equating to approximately $3,450 in electricity bill savings.

Upon completion of the multi-purpose room lighting upgrade, a workshop was held with SEE Program business partners and numerous school district facility operators from surrounding areas to discuss the project and its various energy efficient technologies.

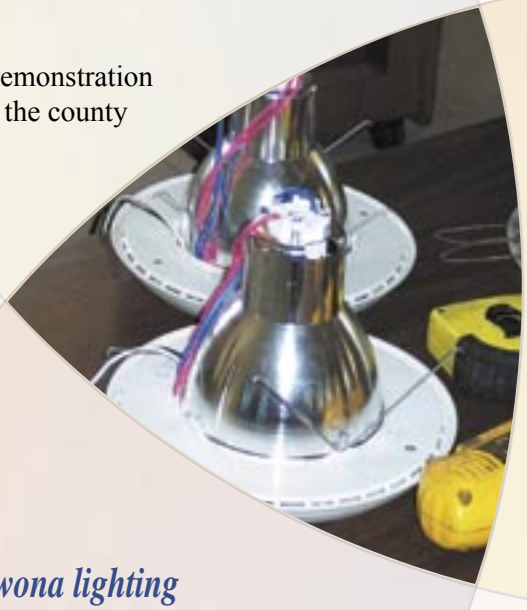
	Before Retrofit	After Retrofit
Number of Fixtures	72	72
Watts	150 (Incandescent)	42 (CFL)
Total Watts Used in One Hr	10,800 Watts	3,024 Watts
KW Total	10.800 KW	3.024 KW
Total Annual Hrs of Use	2,400 (12 hrs/day and 200 days/yr)	1,800 (9 hrs/day and 200 days/yr)
kWh Used in One Yr	25,920 kWh	5,443 kWh
Cost per kWh (actual district cost)	$0.17	$0.17
Approx. Useful Lamp Life	2,000 hours	10,000 hours
Lamps per Fixture per Yr	1.2 lamps	0.2 lamps
Total Lamps Replaced per Yr	86.4 lamps	13.0 lamps
Annual Lamp Replacement Cost	$64.80 ($0.75/lamp)	$97.20 ($7.50/lamp)
Lamp Replacement Savings per Yr		($32.40)
Total Annual Lighting Cost	**$4,471.20**	**$1,022.54**
Energy Savings		**20,477 kWh**
Cost Savings		**$3,448.66**

INTEGRATING THE SCHOOL SITE INTO CLASSROOM ACTIVITIES

The Wawona demonstration project was intended to educate district facility managers about energy efficient technologies and their applications, and also to serve as an educational resource for teachers and students. To begin the process of using the school site as a teaching tool, the program team—including the SCSA energy consultant, the FUSD Science Department, school administrators, students, and teachers—was involved in the planning and design of the project from its inception. This enabled them to understand the project's components and develop appropriate educational lessons. The following highlights various ways the program team integrated the project into classroom activities:

- Students were involved in a pre- and post-installation quantitative and qualitative analysis. Data loggers, which measure light and heat, were installed in the multi-purpose room approximately one month prior to the installation date and then re-installed one month post-installation.

- The lead teacher on the data logger project has taken a cross-curriculum approach, incorporating the project into both language arts and science lessons. For example, students are learning about energy and energy efficiency in their writing, reading, science, and speaking skills classes. Students are keeping journals about the lighting demonstration project as well as making energy savings calculations based on information retrieved from the data loggers.
- Wawona students plan to enter the demonstration project's educational components in the county science fair.
- An *Educational Activities to Support a Lighting Retrofit Demonstration Project* binder, targeting grades 7 and 8, was developed and provided to the FUSD Science Department. The binder contains detailed lessons and educational projects related to light and lighting that were developed by such organizations and agencies as the National Energy Education Development (NEED) Project and the U.S. Department of Energy.
- The binder provides activities to help disseminate energy efficiency information to the broader community (e.g., parents' back-to-school nights and science learning projects). The binder also provides a list of online energy resources, and a discussion of how the lessons relate to California's Content Standards.



"The Wawona lighting demonstration project made a huge difference in the available light without having to completely tear apart the ceiling to retrofit the fixtures."

Lyn Peters,
Manager of Environmental Services
Fresno Unified School District

FOR ADDITIONAL INFORMATION

For more information regarding the SEE Program visit:

www.scsa.ca.gov/energy_education.htm

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